Carolina Division of Environmental Management, oral commun., 1991). Moreover, there are proposals to construct new industries, which would be major waste dischargers and users of water. Dioxin has been detected in the tissue of fish taken from the Roanoke, and health advisories have been posted, warning against eating fish taken from the area. Albemarle Sound also receives waste streams from the Chowan basin, which has a history of water-quality management problems, although waste loadings from the North Carolina part of the basin have been reduced in recent years. Accumulations of heavy metals have been detected in the sediments of Albemarle Sound.

Loss of habitat from declining water quality is also a concern. There is strong indication that mortality and poor reproductive success of some fish stocks are related to the loss of adequate summer estuarine habitat (Coutant, 1985). This loss of habitat occurs when temperatures are too high or when dissolved-oxygen concentrations are too low. The existence of these conditions has been documented for Albemarle Sound (Kornegay, 1988). Occurrence of hypoxia adversely affects other living resources and may be evidence of more pervasive water-quality problems.

Transport, mixing, and circulation processes need to be characterized in the complex Roanoke River delta and in Albemarle Sound. A better description of these processes is needed in order to (1) define flow conditions which are conducive to the survival, recovery, and future productivity of Roanoke River-Albemarle Sound fish stocks, and (2) provide the kinds of basic information needed for wasteload allocation and water-quality management.

Purpose and Scope

This report provides information collected during the initial phase of the investigation of flows in the lower Roanoke River and on the water quality and hydrodynamics of Albemarle Sound. Plans for completing the study are also described in this report. Because the originally proposed data collection has not been completed, conclusions in this report are considered to be preliminary pending the completion of the investigation.

Flows in the lower Roanoke River are investigated using data from a network of water-level recording stations and using a one-dimensional unsteady flow model. The model has been calibrated and validated for the reach of the Roanoke between the State Highway 11-42 bridge and Williamston. Results of the calibration and validation process are presented. The model has been extended downstream to Jamesville, but calibration is not complete; preliminary results are presented.

Water temperature, salinity, and dissolved-oxygen conditions in Albemarle Sound are characterized using data from water-quality monitors, which record information at 15-minute intervals at 10 sites in the sound. Some water-level variations in Albemarle Sound and the computational grid for the Albemarle Sound hydrodynamic model also are presented.

Geographically, this report includes information from the lower 137 mi of the Roanoke River (fig. 1), from Roanoke Rapids to the mouth, and all of Albemarle Sound. Most of the data presented in the report were collected between January 1990 and April 1991. Some data collected during earlier periods were used to calibrate, validate, and operate the Roanoke River flow model.